# CANON REPAIR GUIDE

## CANON F-1
(REF. NO. 1-20711)

CANON INC. JAPAN

# PREFACE

This Repair Guide is issued to insure the continued high quality of the CANON F-1 through correct repair procedures.

This Guide consists of four parts, i.e., Repair Guide General, Disassembly, Replacement and Adjustment, and Reference Data.

If any repairs are required, refer to this Guide. Any comments or suggestions concerning this Guide will be appreciated.

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# Repair Guide General

The Canon F-1 camera is the nucleus of the best, most complete 35 mm photographic system ever manufactured. Since there are so many interchangeable components in the system, it is essential that tolerances be kept to an absolute minimum on both the basic camera and all other components of the system to prevent excessive "tolerance-buildup" and insure total interchangeability of components. A repair that might not be extremely critical in a "fixed-prism, non-motor" SLR, in which all parts, except lens, are fixed permanently in place and adjusted as a unit; becomes extremely important in the F-1 with its interchangeable prisms, meters, finders, motors, backs, etc. This requires utmost diligence and attention to detail on the part of the repair technician. Repair details for the F-1 system are covered in this and several other Repair Guides. The Service Manuals are listed (on the following page) for your convenience.

The following are items of special interest concerning F-1 repair.

1. During manufacture, final machining and drilling of the mirror box is completed after it is mated to the main body casting to insure greatest accuracy. Since this is impossible with service parts, replacement mirror boxes are supplied with the machining completed, but with the mounting flange face cut 0.2 mm deeper than normal to allow a greater range of adjustment.

2. The exposure meter and CdS matched to each other and adjusted with a precision fixed resistor to insure greatest accuracy. Service parts are matched in the same manner and supplied only as a set. The meter unit must be changes as a set only.

3. Winding torque is very important since it directly effects the operation of the Motor Drive Unit. Static torque tolerances are listed in the Repair Guide, but as a double check, check the operation with a known-good Motor Drive Unit

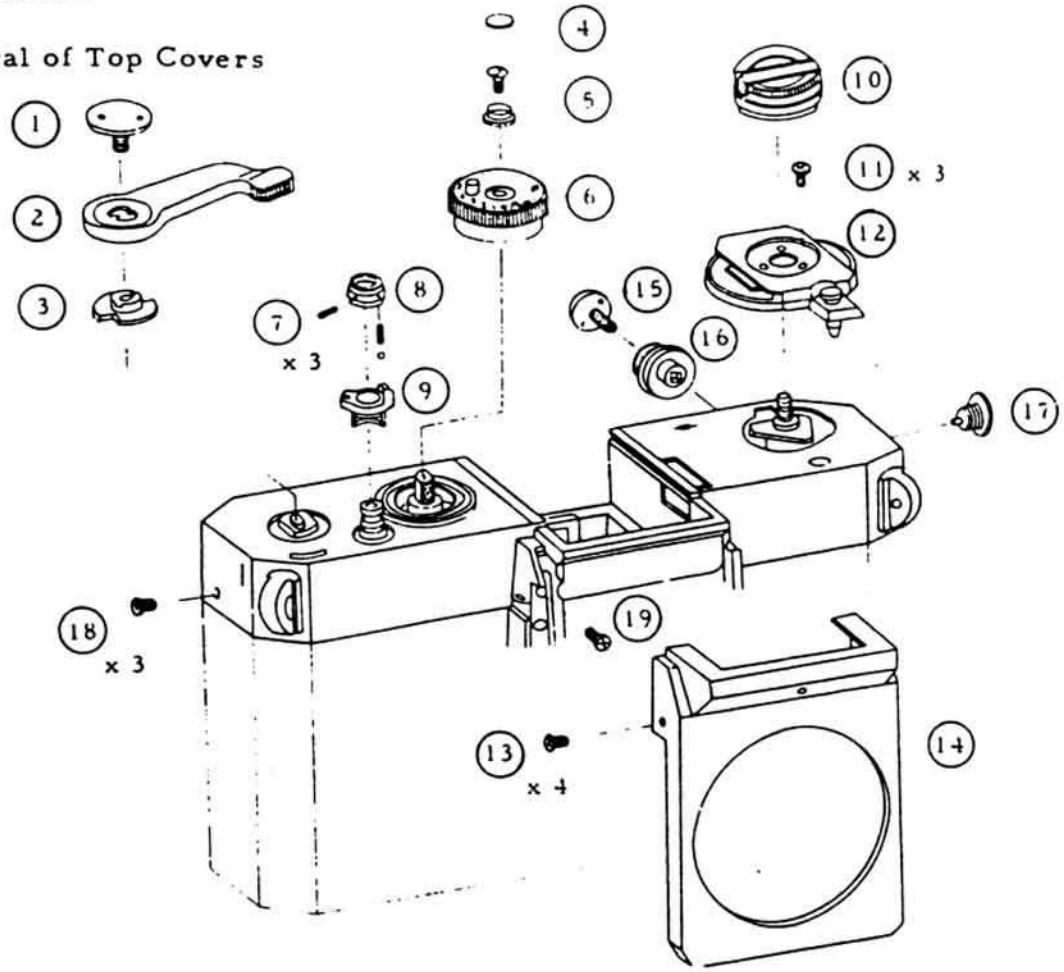
The Service Manuals of the F-1 system are:

| Binder No. | Components | Remarks |
|---|---|---|
| C-030 | F-1 camera | Including Eye-level prism |
| L-005 | Wide-Angle Lenses | Repair Manual only |
| L-006 | Standard Lenses | Repair Guide 50 mm 1:1.4** |
| L-007 | Telephoto Lenses | Repair Manual only |
| S-003 | Motor Drive Unit<br>Film Chamber 250 | |
| S-004 | F-1 Finders | Servo EE, Booster T, and Speed Finder |
| S-005 | Accessories | All other accessories |

** : This Repair Guide serves as a standard for all FD Lenses.

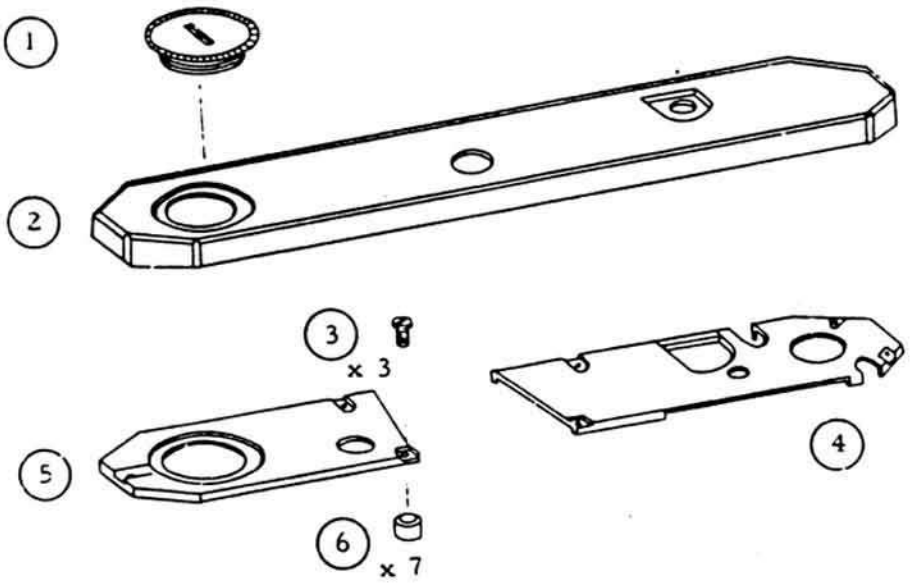
# 1. DISASSEMBLY

## 1.1 Removal of Top Covers




| | | | |
|---|---|---|---|
| 1 | Pin Face Screw 13-9415 | 2 | Winding Lever 19-0654 |
| 3 | Winding Lever Seat 13-9411 | 4 | Leather 13-9865 |
| 5 | Screw 13-9874 | 6 | Shutter Speed Dial 18-0696 |
| 7 | Screw X10-170258 x3 | 8 | Shutter Button Ring 13-9600 |
| 9 | Shutter Button Lock 13-9601 | 10 | Rewind Crank 18-0474 |
| 11 | Screw X99-0056 x3 | 12 | Accessary Shoe Base 13-9679 |
| 13 | Screw X91-170041 x 4 | 14 | Front Cover 13-9405 |
| 15 | Pin Face Screw 13-9805 | 16 | Switch Knob 13-9804 |
| 17 | Flash Terminal 19-0649 | 18 | Screw X95-170041 x3 |
| 19 | Screw X16-1700257 | 20 | Top Covers 19-0617+19-0605 |

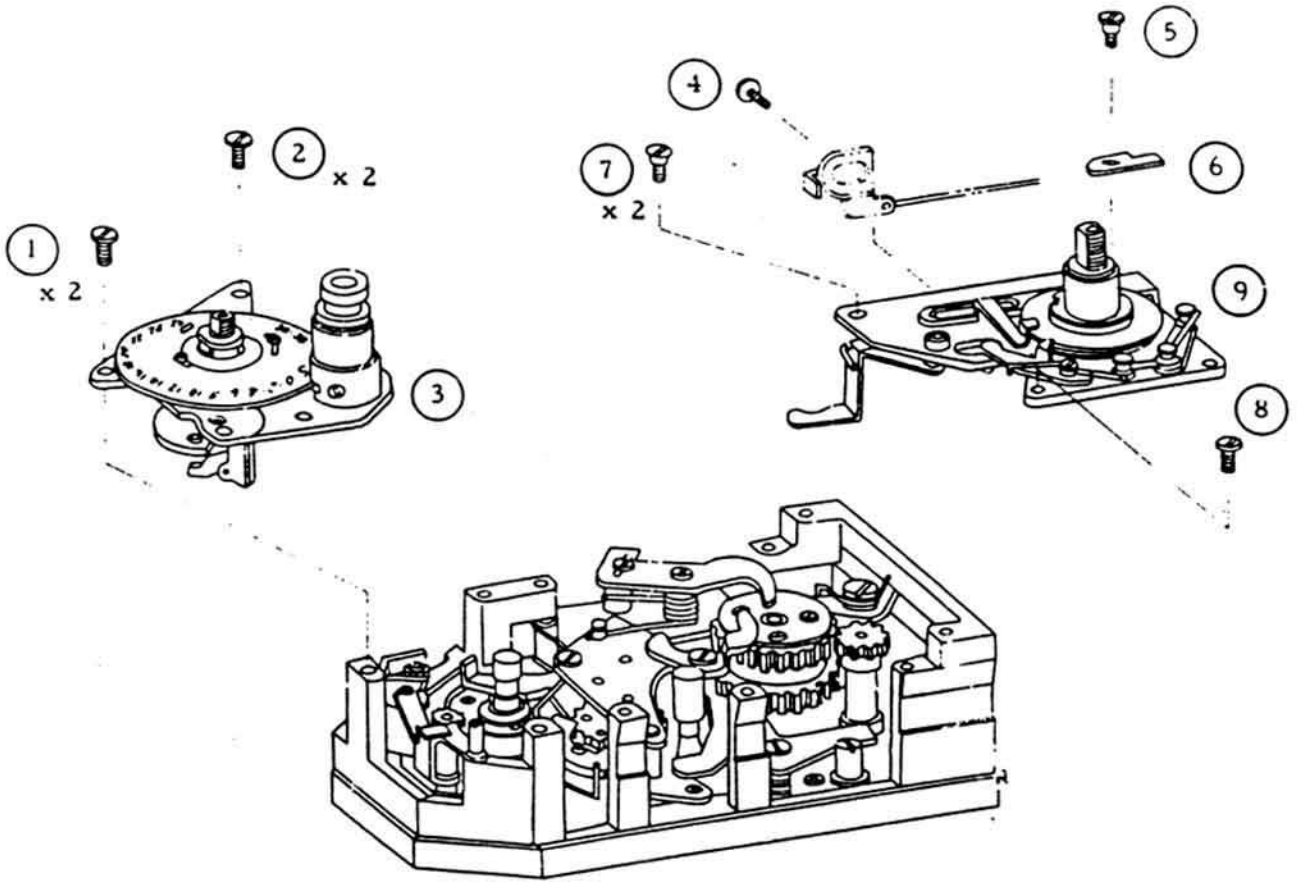
## 1.2 Removal of Bottom Covers




| | | | |
|---|---|---|---|
| 1 | Battery Cover 19-0681 | 2 | Base Cover 13-9406 |
| 3 | Screw X21-140308 x7 | 4 | Inner Cover 13-9518 |
| 5 | Inner Cover 13-9519 | 6 | Collar 13-9681 x7 |

(Note) Install the collar on Body with Diabond (bonding agent).

## 1.3 Winding-Counter Unit and Shutte. Speed Selector



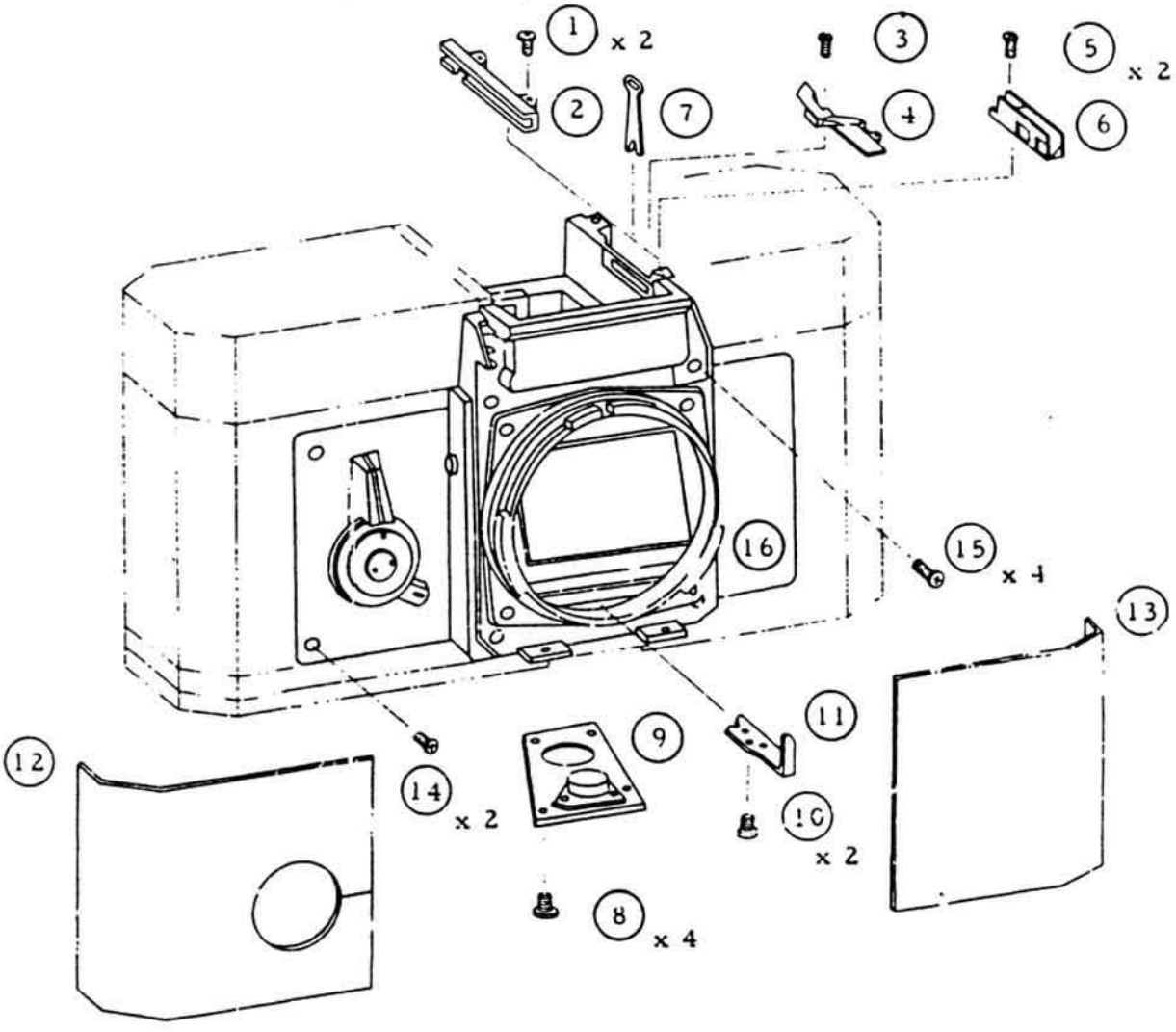

1. Removal of Winding Counter Unit

2. Removal of Shutter Speed Selector

| | | | | | |
|---|---|---|---|---|---|
| 1 | Screw X16-170357 | x2 | 2 | Screw X18-170357 | x2 |
| 3 | Winding-Counter Unit 18-0476 | | 4 | Screw X91-143004 | |
| 5 | Screw 97-4307 | | 6 | Play Arrester 13-9887 | |
| 7 | Screw X18-170357 | x2 | 8 | Screw X16-170357 | |
| 9 | Shutter Speed Selector 18-0477 | | | | |

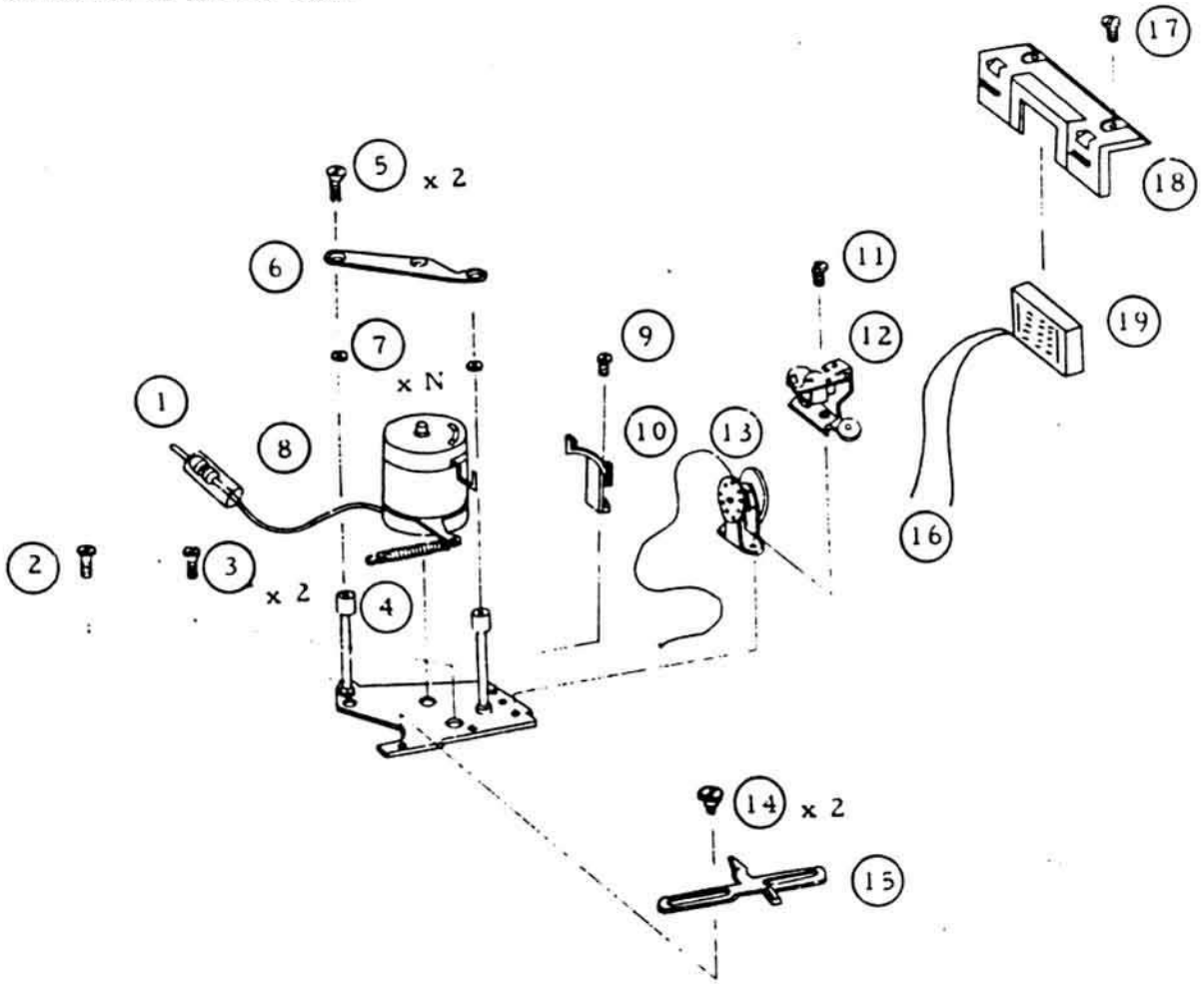
(Note) When detaching Winding-Counter Unit, as the flange of Winding Lever Shaft interferes with the lever of Film Counter Feeding Gear, it is necessary to separate the flange.

## 1.4 Removal of Front Panel (Mirror Box)




| | | | |
|---|---|---|---|
| 1 | Screw X16-200457 x2 | 2 | Rail 13-9702 |
| 3 | Screw X91-122315 | 4 | Warning Lever 13-9726 |
| 5 | Screw X11-140208 x2 | 6 | Prism 13-9722 |
| 7 | Needle 13-9664 | 8 | Screw X18-200408 x4 |
| 9 | Tripod Socket 19-0682 | 10 | Screw X11-170192 |
| 11 | Diaphram Release Lever 13-9573 | 12 | Leather 13-9778 |
| 13 | Leather 13-9779 | 14 | Screw X18-170357 x2 |
| 15 | Screw X18-200607 x4 | 16 | Front Panel (Mirror Box) Assembly |

## 1.5 Removal of Meter Unit



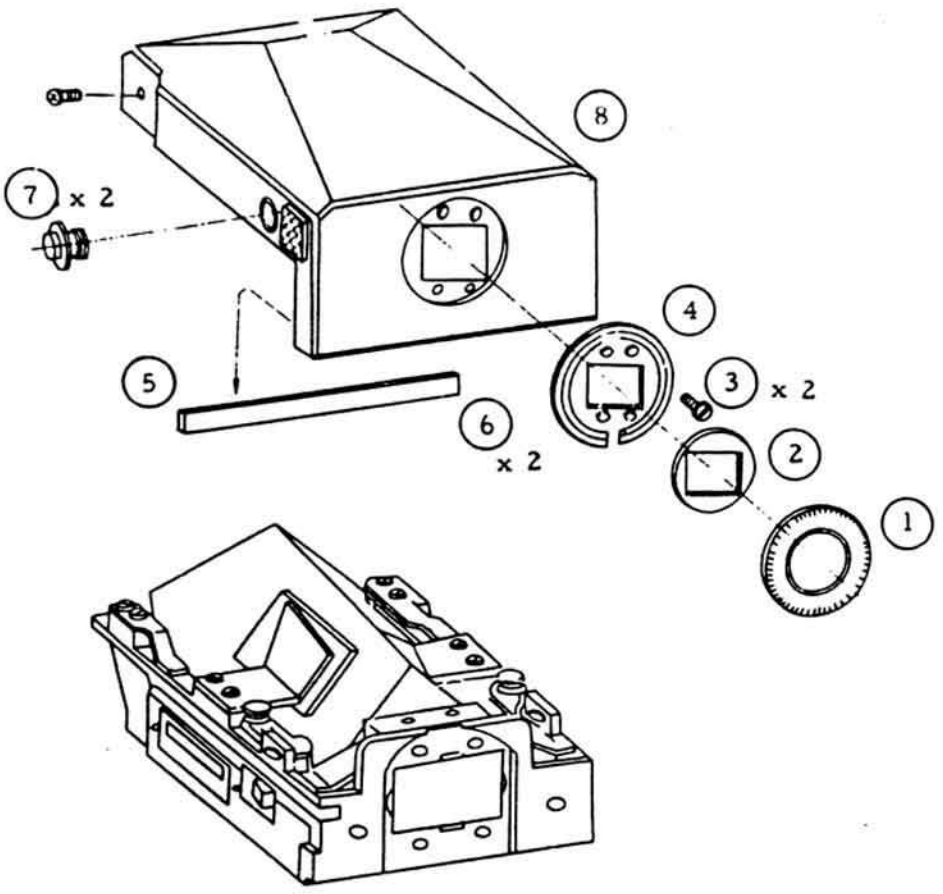

1. Disconnection of lead

| | | | |
|---|---|---|---|
| 1 | Screw X16-170308 | 2 | Screw X18-170308 x 2 |
| 3 | Spring 97-5648 | 4 | Screw X14-140304 x 2 |
| 5 | Meter Holder 13-9781 | 6 | Washer X32-501822 x N |
| 7 | p/o CdS Meter Unit Y00-1266 * | 8 | Screw X11-140204 |
| 9 | Meter Stopper 13-9830 | 10 | Screw X11-140224 x 2 |
| 11 | Pulley 19-0678 | 12 | Shutter Speed Indicator 19-0687 |
| 13 | Screw X96-142193 | 14 | Meter Setting Lever 19-0667 |
| 15 | Disconnect leads | 16 | Screw X99-0023 x 2 |
| 17 | CdS Case 19-0690 | 18 | p/o CdS Y00-1266 * |

Note: Install the CdS with Diabond (bonding agent).

*: The CdS Meter and resistor are a unit (Y00-1266) and must not be changed separately.

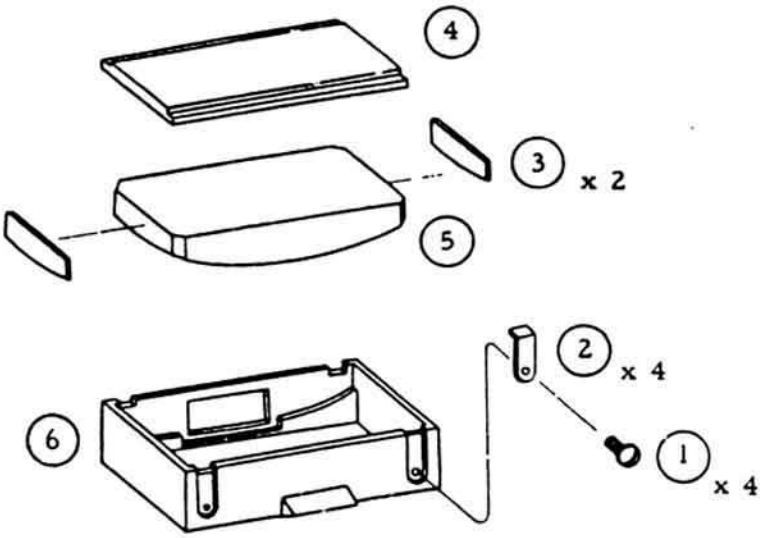
## 1.6 Removal of Pentaprism Cover




| | | | |
|---|---|---|---|
| 1 | Eyepiese Ring 19-0673 | 2 | Mask 13-9752 |
| 3 | Screw X24-140307 x4 | 4 | Eyepiece Base 13-9750 |
| 5 | Accessary Plate 13-9753 | 6 | Screw x2 X95-170041 |
| 7 | Lock Release Button 13-9767 | 8 | Pentaprism Cover 19-0672 |

(Note) Assemble the Pentaprism Cover with the notched groove of the Eyepiece Base turned down.

## 1.7 Disassembly of Focusing Screen




| | | | |
|---|---|---|---|
| 1 | Screw 13-9707 x4 | 2 | Focusing Screen Holder 13-9706 x4 |
| 3 | Tape 13-8992 x2 | 4 | Finder Screen A 10-0258 |
| 5 | Condenser Lens 12-0263 | 6 | Condenser Lens Box 13-9705 |

(Note) Disassembly of Focusing Screens B, C, and D is the same although the some of the part numbers are different.

## 2. REPLACEMENT and ADJUSTMENT

### 2.1 Sprocket

1. Removal of Sprocket

To replace the sprocket, remove the following parts; Shutter Speed Selector, Winding-Counter Unit, Brake Lever and Slow Governor.

To replace Sprocket Gear, the Shutter Charge Gear must be detached also.

Refer to Para. 1.3, 2.2, 2.7, and 2.9.

2. Mounting of Sprocket Clutch

1) Apply GE-7 to the oil groove over the circumference of Sprocket Gear (97-0666).
2) Install the parts as shown in Fig. 1.

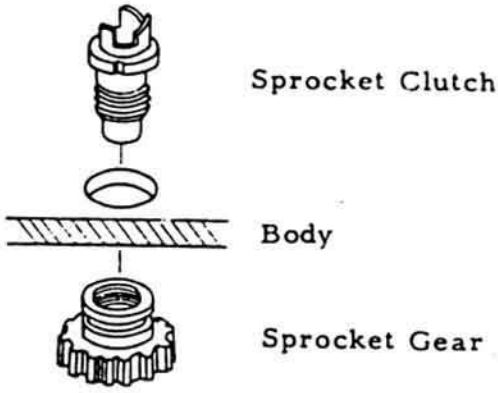



Fig. 1

3. Mounting of Sprocket

1) Install each part as shown in Fig. 2.
2) Apply GE-7 to the inside of Brake Lever Shaft and put Washer (X32-502122) on the Shaft.
3) Apply GE-7 to the upper and lower internal circumferences of Sprocket.
4) Install Washers (X98-050375, 6) x n on Sprocket Clutch.

4. Adjusting

1) Make Sprocket Pawl and Inner Rail equal vertically. Make adjustment with Washers (X98-050375, 6) x n.
2) Make adjustment with Washers (X32-503121, 2) x n so that vertical play of Sprocket is between 0.1 and 0.2mm.

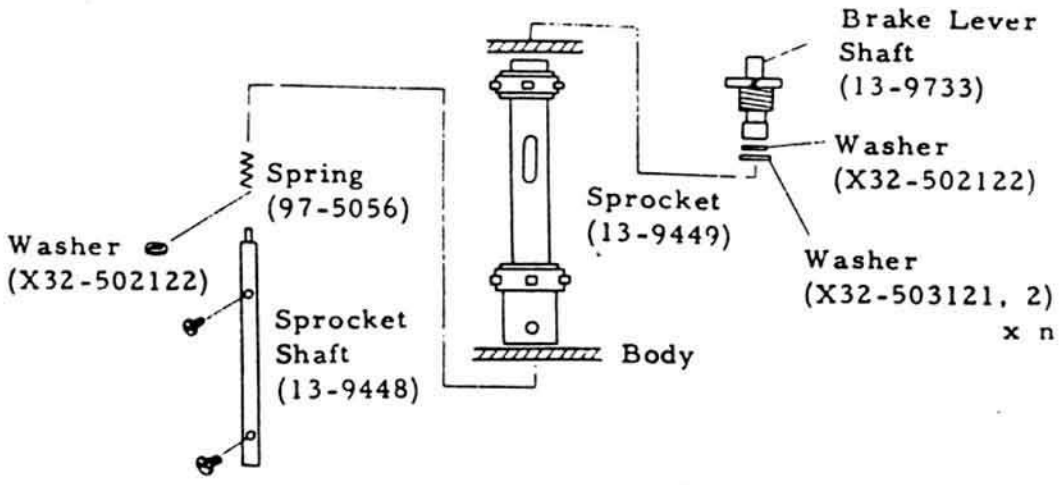



Fig. 2

5. Mounting of Sprocket Shaft

1) Insert Spring and Sprocket Shaft from underside.

2) Put in Washer (X32-502122) from the slot of Sprocket, as shown in Fig. 2

3) Install each part in the sequence shown in Fig. 2.

(Note) Apply GE-7 to the fitting part of Sprocket Shaft.

2.2 Brake and Associated Parts

To replace parts related to the Brake; the Shutter Speed Selector, Winding-Counter Unit and Slow Governor must be removed.

However, to make the Brake torque adjustment, it is not necessary to remove the above parts.

1. Mounting of Brake Band Base

Mount it with Screw (X16-170228), putting the eccentric dowel in the hole of Main Body.

(Note) Apply Diabond (bonding agent) to the Screw after the Base is mounted.

2. Mounting of Brake Lever

1) Apply GE-7 to Brake Lever.

2) Install each part as shown in Fig. 3.

(Note 1) 2nd Brake Lever (19-0666) should be installed together with Master Gear Unit (18-0485).

(Note 2) Don't grease the Spring seat.

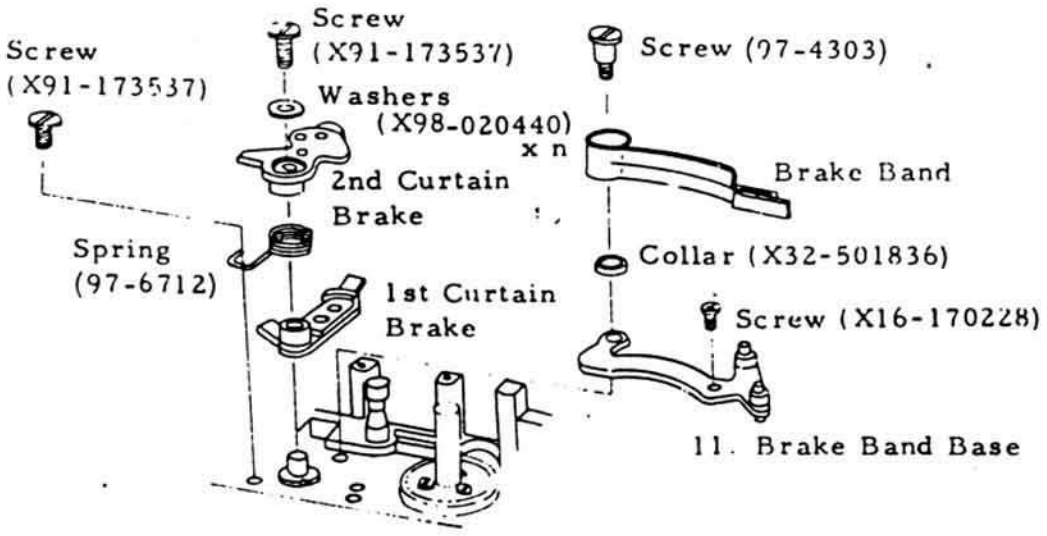


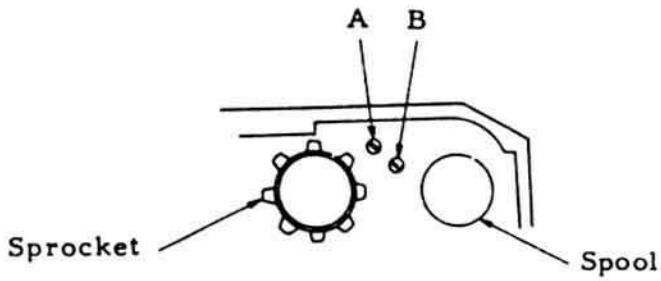

Fig. 3

3. Adjusting

1) Make adjustment with Washers (X98-020440 to 2) x n so that vertical play of the Brake Lever is between 0.05 to 0.15mm.

2) Make adjustment with the eccentric screw so that 1st Curtain Brake torque is between 500 and 600 g and 2nd Curtain Brake torque, 300 to 400 g.

3) For adjusting the Brake torque externally, use the eccentric screws A and B shown in Fig. 4.




A: For 2nd Curtain Brake

B: For 1st Curtain Brake

Fig. 4

## 2.3 First and Second Curtain

1. Installation of the 2nd Curtain

1) Mount the Curtain as shown in Fig. 5.

2) When the mechanism is wound, the distance between the 2nd Curtain edge and the edge of the aperture should be 6 to 6.5mm. See Fig. 6

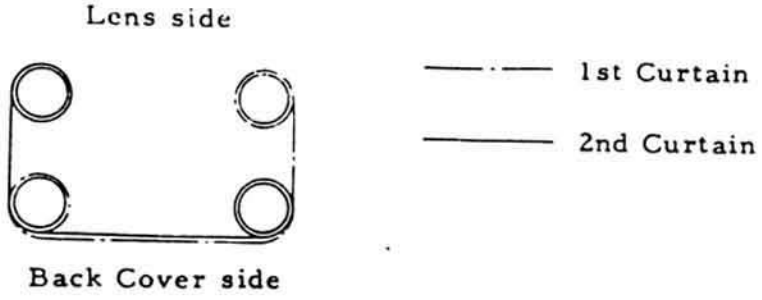



Fig. 5

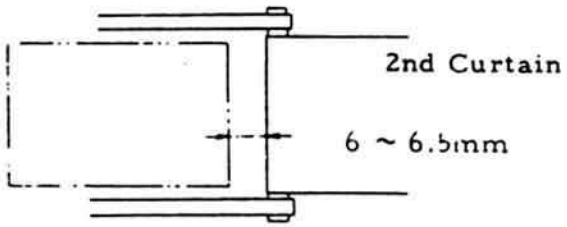



Fig. 6

(Note) Bond the ribbon, with the mechanism wound, completely around the drum, but with no overlap.

2. Installation of the 1st Curtain

1) Mount the Curtain as shown in Fig. 5.

2) The 1st Curtain must overlap the 2nd Curtain by 2.0 to 2.5mm at all positions.

3) Bond the ribbon, with the mechanism not wound, completely around the roller, but with no overlap.

(Note) The ribbon must be wound evenly on the roller.

## 2.4 Spool

1. Spool Unit

1) Install each part in the order shown in Fig. 7.

(Note 1) Apply $MoS_2$ grease to Washers.

(Note 2) Install the Bushing with Diabond (bonding agent)

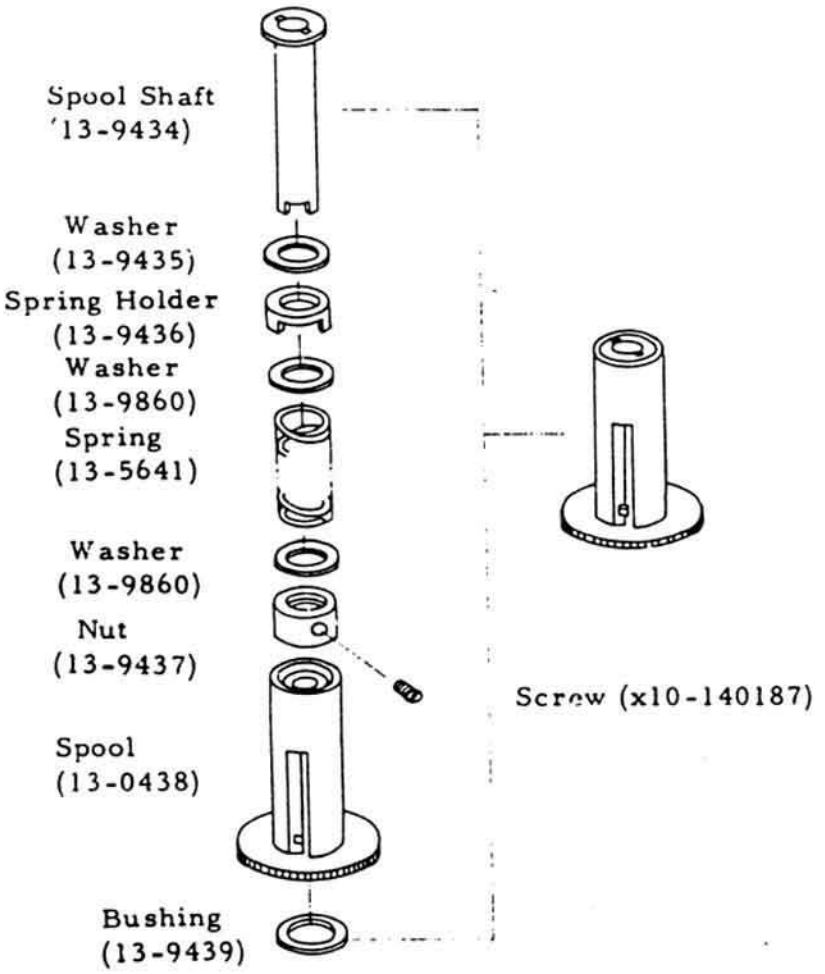



Fig. 7

2. Spool Torque adjustment

1) Measured at 13-9434 with a torquedriver, the torque should be 60 to 120 gcm. Adjust Spring (97-5641).

2) Measured with a string around 13-9438 and a tension gauge it should be 93 to 185 g.

## 2.5 Winding Shaft and Associated Parts

1. Winding Gear Unit Install each part in the order shown in Fig. 8.

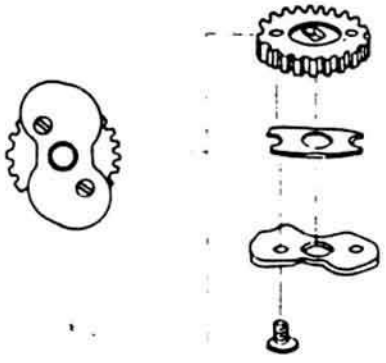


Fig. 8

(Note 1) Apply Diabond (bonding agent) to the Screws.

(Note 2) Be careful about the mounting direction of Cam.

2. Winding Shaft Unit

Install each part in the order shown in Fig. 9.

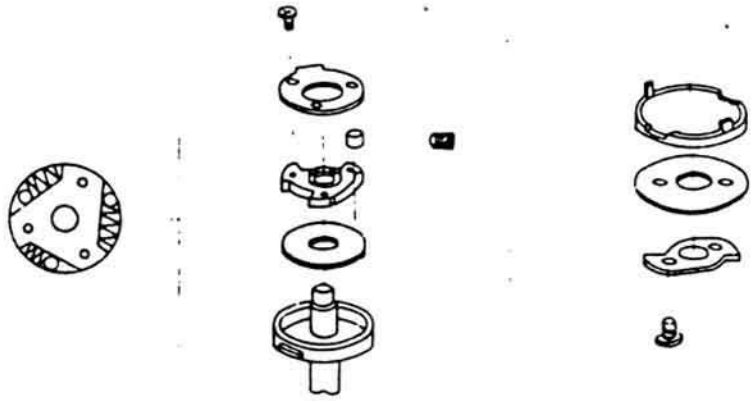


Fig. 9

(Note) After each part is installed, apply Diabond to the Screws.

3. Mounting and Adjustment of Winding Shaft Unit and Sppl Unit

1) Wind the camera.
2) Apply GE-7 to the following parts: oil groove of Winding Shaft, Stell Ball, inner face of Spool Gear and bearing race.
3) Apply $MoS_2$ grease to Brake Charge Cam (13-9431).
4) Install each part as in Fig. 10.

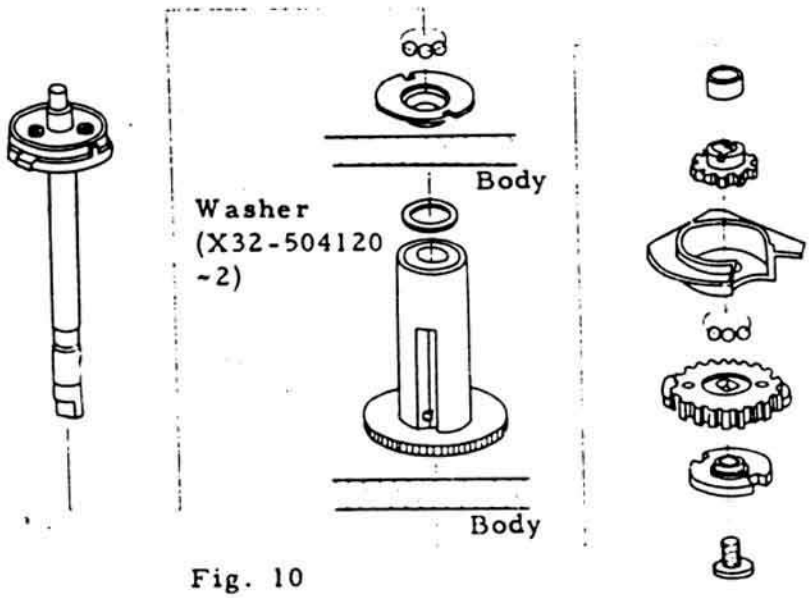



Fig. 10

(Note) Use 15 Steel Balls (X71-7131) for the upper and the lower bearing.

5) Make adjustment with Washers (X32-504120 to 2) x n so that vertical play of Spool Shaft is 0.1 to 0.2mm.

6) Setting Winding Shaft as shown in Fig. 11, install Winding Gear unit.
Make adjustment by aligning the gear engagement.

Place the ears exactly as shown.

Fig. 11

(Note) Apply a bonding agent to the mounting screw of Winding Coupler (13-9443).

## 2.6 Shutter Speed Selector and Winding-Counter Unit

1. Shutter Speed Selector — Install each part as shown in Fig. 12.

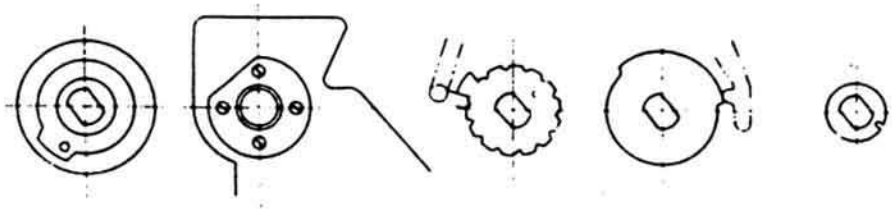


Fig. 12

(Note 1) Grease Bearing (13-9480) and Cam Shaft with GE-7.

(Note 2) Apply bonding agent to Screw (X14-170157).

2. Mounting of Shutter Speed Selector — Refer to "Disassembling" (Para. 1.3)

(Note 1) Anchor Release Lever must be inside (Lens side) Anchor Release Lever of Slow Governor.

(Note 2) Clearance between Play Arrester (13-9887) and Meter Setting Lever (19-0832) should be 0.03mm.

3. Winding-Counter Unit — Install each part in the order shown in Fig. 13.

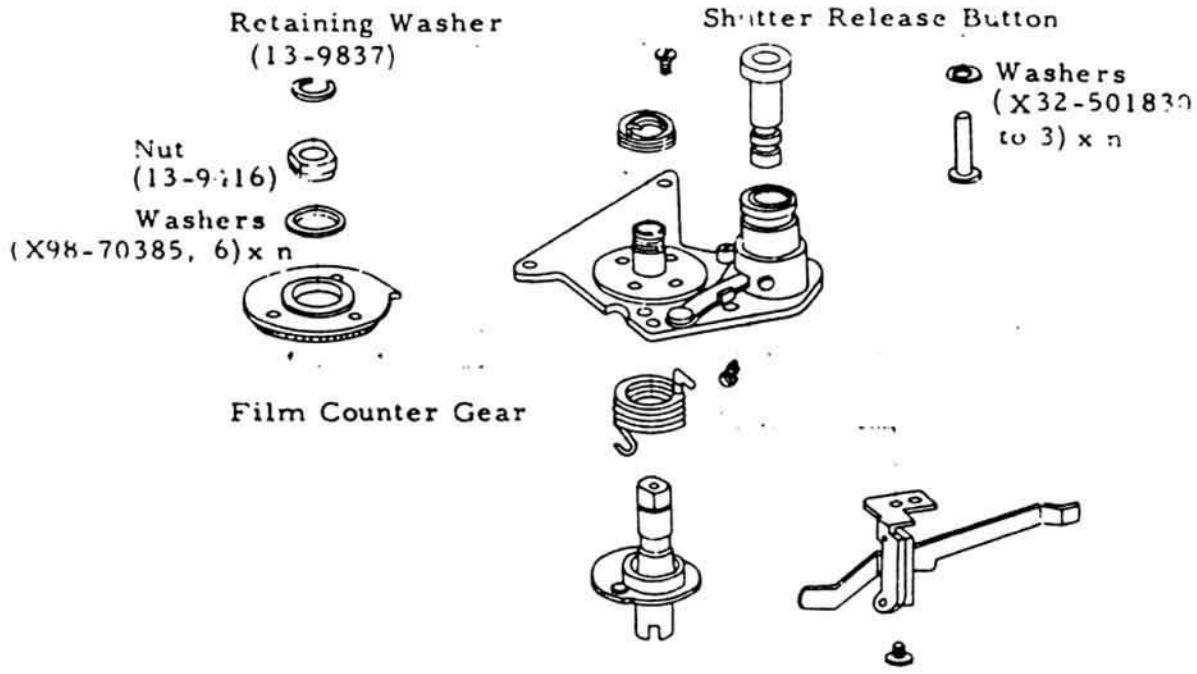



Fig. 13

(Note 1) Nut (13-9416) has left-hand threads.

(Note 2) Apply PL-15 to the part between Shutter Release Button and Base Plate.

(Note 3) Apply GE-7 to the oil groove of Winding Shaft.

4. Adjustment of Winding-Counter Unit

1) Vertical play of Winding Shaft must be between 0.15 and 0.25mm.
Adjustment is made by selecting a Retaining Washer (13-9837) which provides the correct play.

2) Vertical play of Film Counter Gear (19-0606) must be 0.05 to 0.1mm. Adjust the play with Washers (X98-70385, 6) x n.

3) Vertical Play of Shutter Release Button must be 0.1 mm or less.
Adjust the play with Washers (X32-501830 to 3) x n.

5. Mounting of Shutter Speed Selector

1) Wind the mechanism.

2) See "Disassembling" (Para. 1 s)

(Note) Switching contact and X contact are at the respective positions shown in Fig. 14.

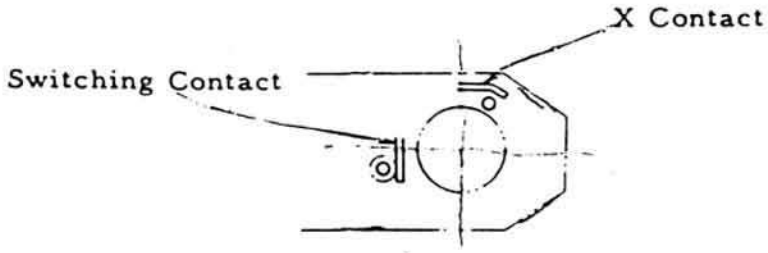



Fig. 14

## 2.7 Shutter Adjustment

1. Mounting and adjustment of Anchor Release Lever

1) Wind the mechanism.

2) 2nd Curtain Brake Lever (19-0666) must touch Anchor Release Lever (13-9729). Make adjustment by aligning the setting position of the Anchor Release Lever.

3) Adjust the Anchor Release Lever by using Tool (Anchor Release Lever Positioning Tool-1) so that A value (0 to 0.2mm) in Fig. 15 can be assured at the Lever end.
Make adjustment by bending B part of the Lever.

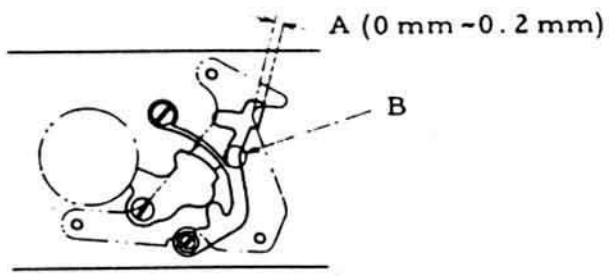



Fig. 15 (With the mechanism wound)

(Note 1) Where the Tool is unavailable, the following must be fulfilled.

i) When Shutter is released at slow speed (under 1/8 sec), the Anchor Release Lever must be cancelled simultaneously with the 2nd curtain closing, and there shouldn't be any furture slow governor sound.

ii) Adjust the slow governor speeds with Eccentric Screw A (fig. 16).

If the Anchor Release is not properly adjusted, it will be impossible to adjust the slow governor with Eccentric Screw A.

2. Mounting and Adjustment of Slow Governor

1) Wind the mechanism.

2) 1/1 sec is to be aligned by eccentric screw A (Fig. 16).

3) 1/8 sec is to be aligned by screw C, slackening screw B.

4) Align the slow speed Shutter by the preceding two adjustments alternately.

(Note 1) Adjust the slow speed Shutter after alignment of Curtain speed.

(Note 2) Sector position is set by the eccentric screw D (Fig. 16). If it is changed, the entire alignment is effected.

(Note 3) Screw C should lightly touch the shaft even when loosened for adjustment.

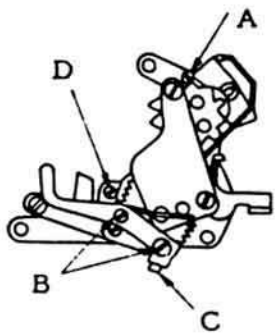



Fig. 16

3. Adjustment of Curtain Speed

1) Full Frame Curtain speed must be between 12.5 and 13.5 ms, and between and ms using the PA-16 Transistor Shutter Tester). Adjustment is made with the Worm Gear.

(Note) After adjustment, apply Diabond to the setscrew.

4. Adjustment of high speed shutter

Refer to paragraph "2nd Curtain Release Lever (19-0656) and 2nd Curtain Release Lever (19-0657). (Page 22)

1) Adjust the Shutter speed of 1/125 sec by the eccentric screw of 2nd Curtain Release Lever (19-0657).

2) Adjust the speed 1/2000 and 1/1000 sec by Release Cam (13-9457). (Fig. 17)

3) For fine adjustment of 1/2000 sec, enlarge or narrow the slot of the Shutter cam. See Fig. 18.

4) Adjust the Shutter alternately through the above adjusting procedures. 1), 2), and 3).

(Note) Check if the Shutter is completely open at 1/60 sec, and "B" (bulb).

Fig. 17

Fig. 18

## 2.8 Shutter Release

1. Adjustment of Shutter Button stroke

The operation of the mechanism related to Shutter button is as shown in the chart.

Unit: mm

| 0 0.4 0.8 1.2 1.6 2.0 | Adjustment |
|---|---|
| Shutter Button free travel — 0.4±0.2 | Adjust by bending |
| Starting of Self-timer — 0.8±0.05 | Position of Charge Lever (19-0621) |
| Total stroke of Self-timer — more than 1.75 | Select Screw (X91-142460) |
| Released position of Diaphragm Release Lever — 1.5±0.1 | For set position, see Page |
| Total stroke of Shutter Button — 2.0±0.1 | Washers (X32-501520 to 2) x n Fig. 19 |

2. Adjustment of Shutter Button pressure

The Shutter Button pressure should be between 150 and 400 g. Also, it should be under 550 g at the Motor Drive Shutter Release Lever (13-9609).

Make adjustment by Spring (97-5057).

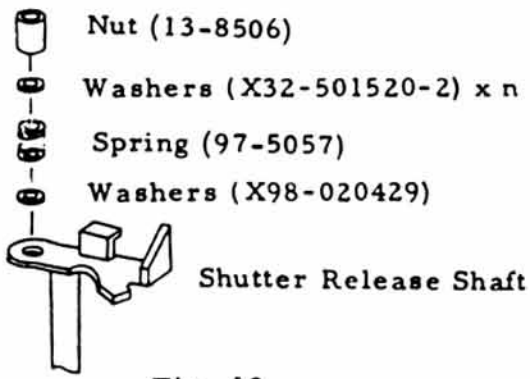



Fig. 19

3. Mounting and adjustment of Shutter Release Lever

(1) For mounting of the Lever, see Fig. 20.

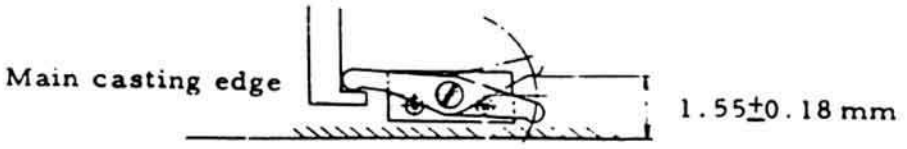



Fig. 20

(2) The Shutter must released within A in Fig. 20. For adjustment, choose a suitable Shutter Release Lever.

## 2.9 Master Gear Unit and Spring Drum Unit

1. Mounting of Master Gear Unit

Apply Astrooil to the oil groove of each part.

(Note 1) The number of steel balls to be used for one part is 10.

(Note 2) Since the Steel Ball (X71-7131) differs from the steel ball (X71-7002) used so far. Be careful not to mix them up.

(Note 3) 1st Curtain Release Lever (19-0655) should be used together with Master Gear Unit as one unit.

(Note 4) 1st and 2nd Curtains master gears cannot be disassembled.

2. Adjustment

Make adjustment with Washers (X32-502610 to 2) x n so that vertical play of 1st Curtain Shaft and 2nd Curtain Shaft is 0.1 to 0.2mm.

3. Mounting and adjustment of Idler Gear and Diaphragm Reset Lever

1) Install the Gear at the position shown in Fig. 21 with Shutter released. Make adjustment by aligning the engaging position of Idler Gear (19-0626).

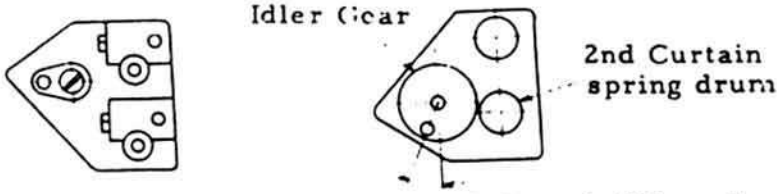



Fig. 21

2) Vertical play of Diaphragm Reset Lever (19-0628) must be between 0.03 and 0.08mm. Adjust it with Washers (X32-502610, 1) x n.

(Note 1) Install the Idler Gear before the 2nd Curtain spring drum is mounted.

(Note 2) Apply astrooil to the oil groove of Idler Gear.

2.10 2nd Curtain Release Lever and 2nd Curtain Cam Follower

1. Mounting of 2nd Curtain Release Lever (19-0656) and 2nd Curtain Cam Follower (19-0657). See Fig. 22.

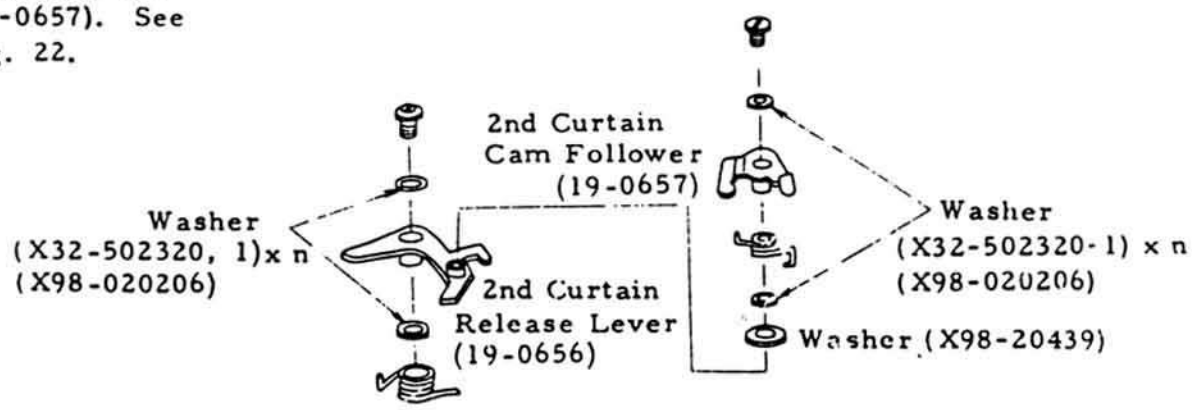



Fig. 22

2. Adjustment of 2nd Curtain Release Lever (19-0656)

1) Vertical play at the end of the Lever must be under 0.15mm. Make adjustment with Washers (X32-502320, 1) x n, (X98-020206).

2) 2nd Curtain Release Lever (19-0656) and Hook must be the same height. Limit : ± 0.1mm Make adjustment with Washers (X32-502320, 1) x n, (X98-020206).

3) Install the Lever and Hook as shown in Fig. 23.

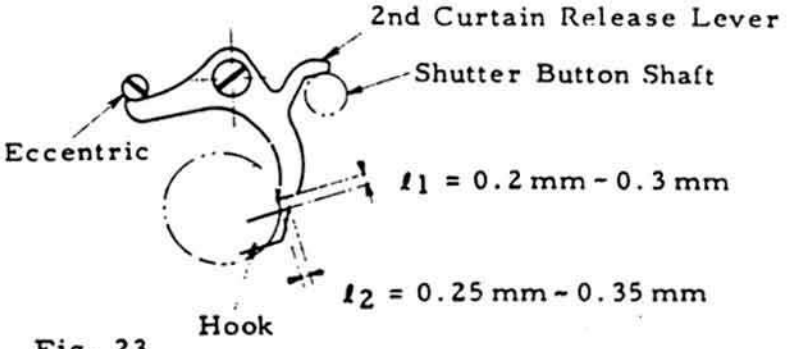



Fig. 23

Adjustment

For $\ell_1$ adjustment, select a suitable 2nd Cutain Release Lever (19-0656). (Fig. 23)

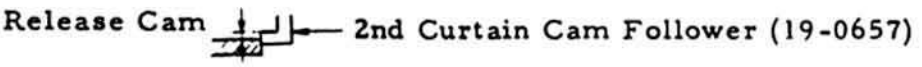
For $\ell_2$ adjustment, align the eccentric screw. (Fig. 23)

(Note) Adjustments 2.10.2 (1) and (2) must be performed together.

3. Adjustment of 2nd Curtain Cam Follower (19-0657)

1) The Follower and Release cam must be the same height.

Limit: +0.1 mm to -0.2 mm




Make adjustment with Washers (X32-502320, 1) x n, (X98-020206).

2) The heights of the Follower and fixed Cam are as shown in Fig. 24. For adjustment, use Washers (X32-502320 to 1) x n, (X98-020206), and chose a suitable Lever. Fig. 24

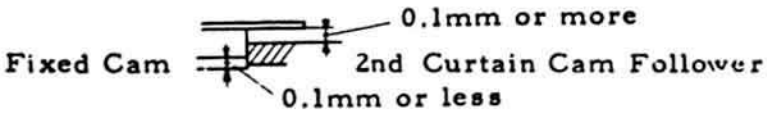



Fig. 24

2.11 Meter Unit

(Note) The Meter, CdS and Variable Resistor are a unit. They must be changed as a unit.

1. Mounting and adjustment of Following Needle

1) To mount the Following Needle (13-9664), refer to Fig. 25.

Fig 25

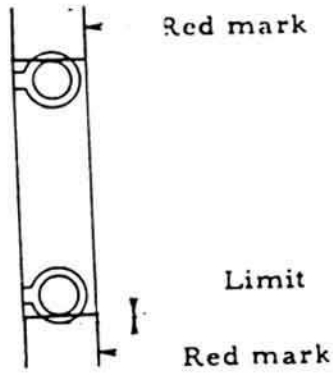



Fig. 26

2) Needle is at the position shown in Fig. 26.

a. When the aperture of FD Lens 50 mm 1:1.4 is open, the inside circumference of the Needle must align with the edge of the lower red mark.

b. At F16 of a FD Lens 50 mm 1:1.4, the inside circumference of the Needle must align with the edge of the upper red mark.

c. Make adjustment by aligning the Needle mounting position.

d. Limit: At F 1.4, the red mark just between the outside and inside circumference of the Needle.

e. The Needle must always be in the center of the information findow, horizontally.

(Note 1) The Needle must swing smoothly contacting the information window frame lightly. (It is perferable to install the Needle after it is bent).

(Note 2) Height of Conection pin of FD50 mm F1.4 Lens must be 8.1±0.1 mm.

(Note 3) When Diaphragm Release Lever is locked, the Needle must disappear. For adjustment, refer to para. 2-15.2.

(Note 4) After the Needle is installed, apply Diabond to it.

2. Mounting of Wire — Install Wire (Y00-1267) on Meter Setting Lever (13-9497).

3. Mounting of CdS

1) Install CdS on CdS case (19-0690). Mount it with Diabond as shown in Fig. 27.

Fig. 27

2) Arrange CdS lead under Meter Unit Base Plate.

4. Mounting of CdS Meter Unit

See Para. 1.5. for disassembly.

(Note 1) Leave Coil Spring (97-5648) mounted on the Meter.

(Note 2) The Meter Unit can be removed without removing the Front Panel (Mirror Box).

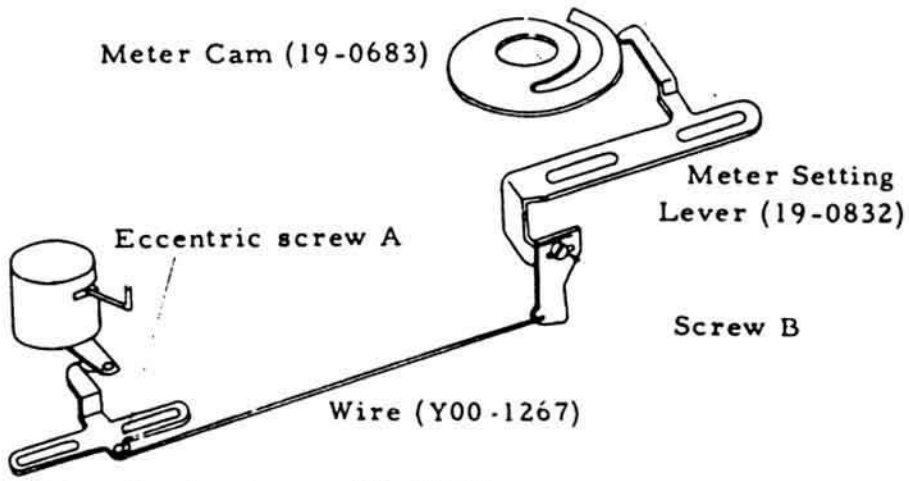



Fig. 28

5. Adjustment of zero position

1) Install Wire and Meter Cam.
The Meter Cam and Meter Setting Lever must be the same height. Make adjustment with Washers (X32-506210 to 2) x n.

2) Set the eccentric screw A (Fig. 28) to its position.

3) At ASA 100 1/125 sec, the inscribed line of Meter Holder (13-9781) coincides with that of Meter Cover. In this case, the lever of Meter becomes perpendicular. See Fig. 29. Make adjustment by turing the screw B. See Fig. 28.

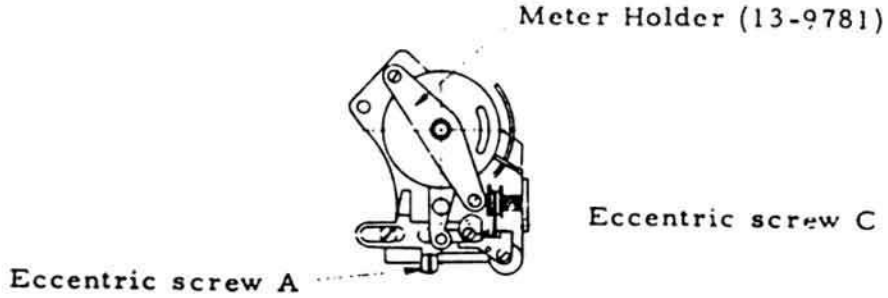



Fig. 29

6. Adjustment of Meter accuracy

1) The Meter needle must stay within the upper and lower red zones. For adjustment, align Meter Stopper (13-9830).

2) The Meter needle must align at the center of the Following Needle at the specified brightness. See Fig. 30. Make adjustment with the eccentric screw A (Fig. 29).

| EV | cd/m$^2$ | ASA | Shutter speed | Aperture value | Tolerance |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Fig. 30

(Note 1) Adjustment of Meter accuracy is to be performed after the Meter zero position is aligned.

(Note 2) For adjustment of Meter accuracy, employ the standard Lens (whose pin and aperture diameter have already been adjusted).

7. Mounting of Prism

1) Install Prism (13-9722).

(Note 1) There should be no black-out in the information window due to the Prism frame.

8. Mounting and adjustment of Warning Lever

1) Warning Lever (13-9726) must work properly between 1/4 and 1/2 sec at ASA 100. Adjust it with eccentric screw C (Fig. 29).

2) At 1/2 sec, the Warning Lever is parallel to the Information Prism. Make adjustment by aligning the

Warning Lever set position.

3) After adjustment, apply Diabond to the setscrew.

9. Mounting of Warning Mark

1) Mount the mark with Diabond.

2) At ASA 100 1/2 sec, the entire Information Prism is covered and at 1/4 sec, it is uncovered.

10. Adjustment of checker

The needle should be at the center of the blue mark at 1.3V. (ASA 100, 1/2000). For adjustment, use the variable resistor.

## 2.12 Shutter Indicator

1. Mounting of pulley
See Fig. 31

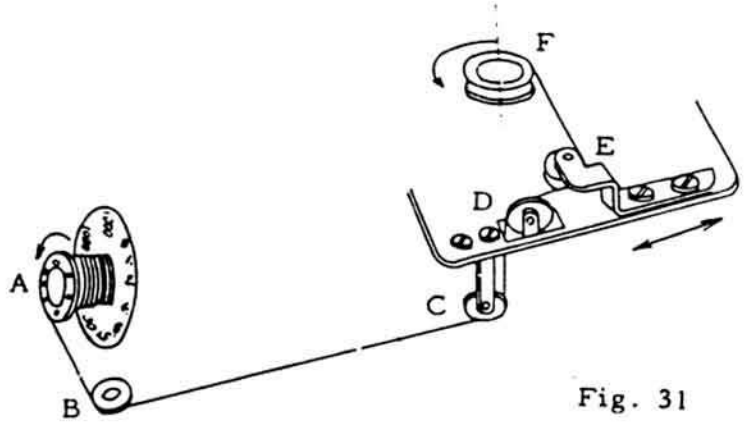



Fig. 31

(Note 1) Install pulley E at the middle of the slot.

2. Adjustment of Shutter indication

1) Set Shutter Speed Dial to "B".

2) Lock pulley A so the spring doesn't unwind. (Pass a piano wire through the hole.)

3) Put the indication string on the pulleys B, C, D and E.

4) Unlock pulley A and check the operation of the pulleys by moving the string forwards and backwards.

5) Bring the character "B" to the center of Shutter indication window. Make adjustment by moving the string forwards and backwards.

6) Knot the string at the string mounting hole position of the pulley F. Make sure the "B" remains in the center of the window.

7) Trim the knot end of the string.

8) After the string is fixed, put bonding agent on the knot only.

9) Check that the full range of shutter speeds appear in

the window when it is turned.

Adjustment: pulley E.

(Note 1) Don't let pulley A spring unwind.

(Note 2) Arrange the indication string parallel to Wire (Y00-1267).

(Note 3) Do not apply bonding agent to any part other than the knot at pulley F.

(Note 4) The indication string is wound in CCW direction on the pulley F.

3. Adjustment of Pulley A spring torque

Pulley A is supplied with the spring wound. It is not necessary to adjust unless it is unwound. Make 2 to 2.5 revolution of Shutter Speed Indicator in CCW direction observing from the pulley A side (Fig. 31).

(Note 1) The indication string is wound about 14° at 1/2000 and about 340° at "B", on the pulley A.

(Note 2) The string should not overlap.

(Note 3) The string knot, at 1/2000 sec, shouldn't be to the right side of perpendicular.

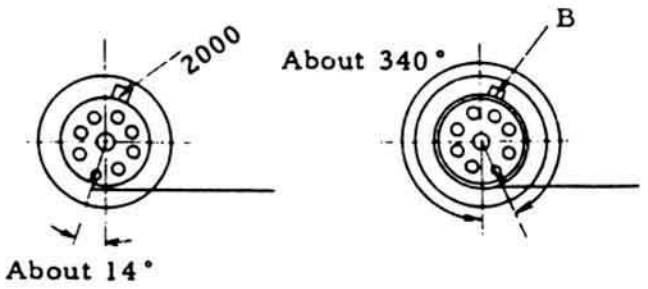



Fig. 32

## 2.13 Shutter Charge Gear

1. Mounting and adjustment of Shutter Charge Gear

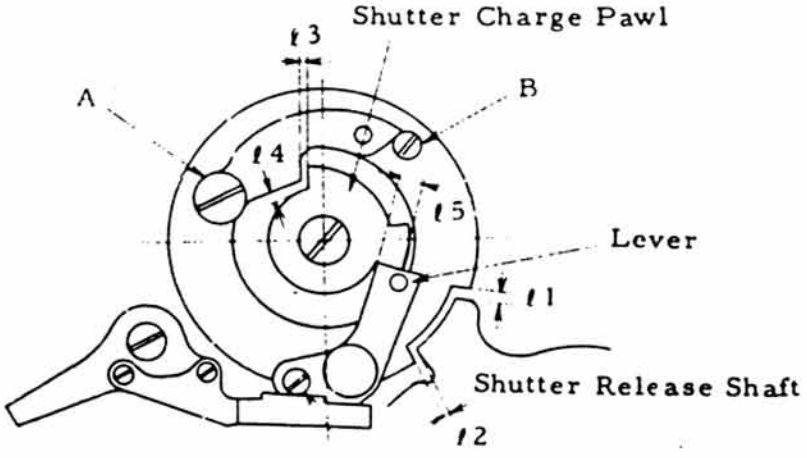



Fig. 33

| Symbol | Dimension | Adjustment | Remarks |
|---|---|---|---|
| $\ell_1$ | 0.3 m.n | Shutter Charge Pawl | Master Gear and Diaphragm release engaged. |
| $\ell_2$ | 0.5 mm | Engaging position of Shutter Charge Gear | With the mechanism fully wound. |
| $\ell_3$ | 0.05 ~ 0.15 | Screw A | With the mechanism wound fully and the winding lever held in the full wind position. |
| $\ell_4$ | 0.1 ~ 0.2 | Eccentric screw B | |
| $\ell_5$ | 0.2 ~ 0.4 | Eccentric screw C | Diaphragm Release Lever released |

1) Vertical play: Shutter Charge Gear (19-0608): 0.05 mm

Adjustment: Washers (X98-060392, 3) x n

(Note 1) Apply GE-7 to the oil groove of the Gear (19-0608) shaft and the holding part of the nut.

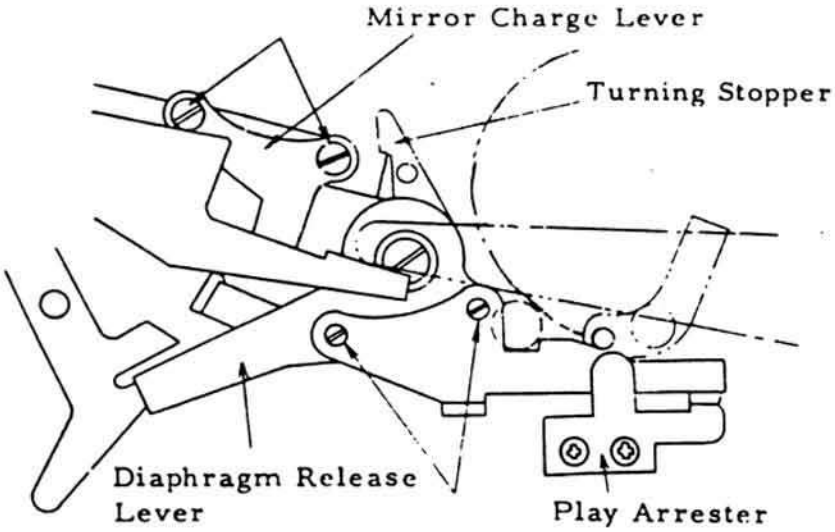
(Note 2) Apply astrooil to the oil groove of Master Gear shaft.

(Note 3) Adjustment of $\ell_5$ must be performed after Diaphragm Release Lever release is alligned. See next paragraph (Fig. 34)

(Note 4) Make adjustment of Shutter charge Gear together with perforation position alignment

## 2.14 Camera Bottom Mechanism

1. Adjustment of release position of Diaphragm Release Lever




The Diaphragm Release Lever releases at Shutter Button stroke 1.5 ±0.1 mm.

Adjust: screw A (Fig. 34).

2. Timing adjustment of Mirror charge Turning Stopper (19-0630) and Diaphragm Release Lever

Maladjustment results in Shutter releasing but mirror does not rise.

1) The Mirror Charge Lever must move over 0.5 mm after the Turning Stopper sets.
Adjust: 2 screws B. (19-0630)

2) The Diaphragm Release Lever should set at 0 to 0.3 mm after the Turning Stopper sets.
Adjustment: choose suitable Turning Stopper (19-0630).

3. Adjustment of Play Arrester (13-9611)

1) Vertical play at the end of Diaphragm Release Lever must be between 0.05 and 0.15 mm. Adjust it with Washer (13-0602).

2) Radial play of Shutter Release Shaft is between 0.05 and 0.1 mm. Adjustment is to be performed by the set position of Play Arrester.

4. Adjustment of Rewind Button set position

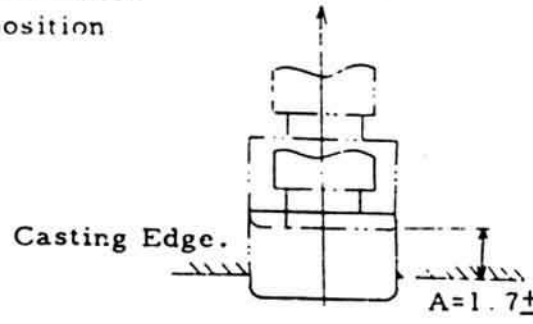



Fig. 35

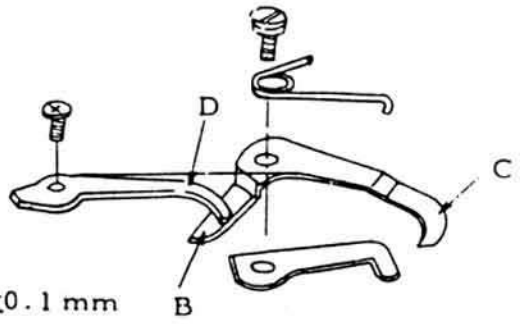
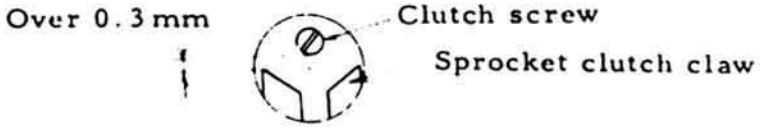



Fig. 36

1) The set position of Rewind Button is "A" in Fig. 35. Make adjustment by bending "B" part (Fig. 36) of Clutch Lever.

2) When the Rewind Button is set, the height of Screw (X91-172491) must be over 2/3 of the thickness of Clutch Lever. Adjust it by bending "C" part (Fig. 36).

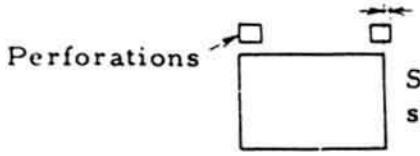
3) When the Rewind Button is set, the clearance between the clutch screw and sprocket clutch claw must be over 0.3 mm.
Make adjustment by bending "D" part (Fig. 36) of Clamp Lever Guide (13-9456).




(Note) When the Button is not set, the Clutch lever must not contact with the Screw (X91-172491).

5. Adjustment of MD Contact — Contact Resistance: Shutter Closed: 0Ω: Open: ∞

6. Film Perforations — When Sprocket is pushed in rewind direction, the film perforations should align as shown in Fig. 37.
Adjustment: Shutter Charge Gear engagement.




Left side: 0

Right side: UP to 1/3

Fig. 37

## 2.15 Front Panel (Mirror Box)

1. Adjustment of Max. Aperture Correction Lever

When Inter Lever (13-9660) is in contact with Needle lever (A in Fig. 38), the clearance between adjusting Plate (13-9662) and the Lever is between 0 and 0.1 mm.

Adjust: Change the position of adjusting Plate.

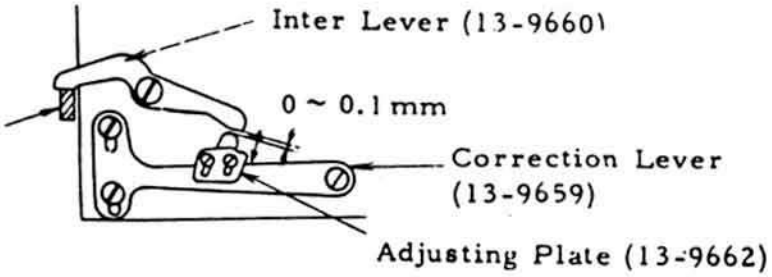
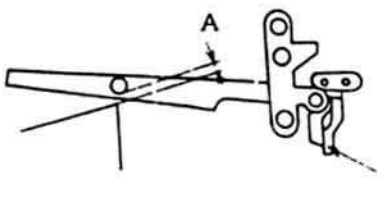



Fig. 38

(Note) Don't move the Correction Lever while making the adjustment.

2. Adjustment of Correction Lever Unit (18-0475)

With the Diaphragm Closing Lever locked, and a 50 mm, 1:1.4 lens installed, the relation between the long lever and the wedge of the aperture control bar should be as shown in Fig. 39. Adjust by bending "B".




A=1.1 mm±0.2 mm

Fig. 39

3. Correction Tip Positioning

The distance from the mounting Flange to the end of Correction Tip (13-9661) must be 6.9 ± 0.1 mm.

(Note) Use a vernier caliper to measure. Do not

push the tip while measuring.

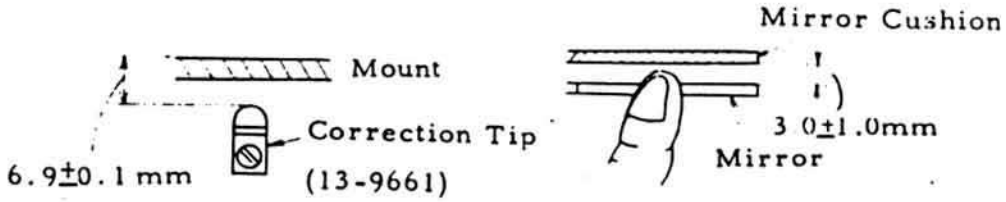



Fig. 40

## 2.16 Miscellaneous

1. Timelag

| | Shutter speed | Limits | Remarks |
|---|---|---|---|
| FP | 1/1000 | (A line on PA-16): 10.5 to 13.5 ms | Clearance between contacts: 1.5 mm to 2.0 mm |
| X | 1/60 | (A line on PA-16): Over 10ms (B line on PA-16): Over 3.2ms | |
| Changeover of FP and X Contacts | Contact is ON: 1/2000 to 1/125 OFF: 1/60 to 1/1 | | |

2. Film Counter

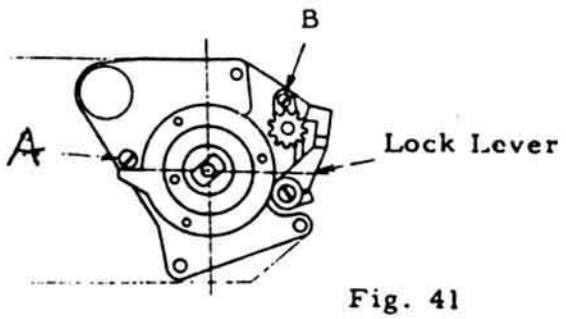



Fig. 41

1) When the back cover is closed, the Film Counter Gear must engage with the Feeding Gear, and the Film Counter Gear shouldn't shift.

2) Adjustment of Counter feeding Eccentric screw B (Fig. 41).

(Note 1) When Lock Lever (19-0653) is released, the Film Counter must return.

3. Adjustment Pentaprism Rail position

1) Install the rail.

2) Use the Pentaprism Rail positioning tool.

(Note 1) Where the tool is unavailable, detach only one of the rails. Decide the other rail position with the Pentaprism.

4. Adjustment of Pentaprism box claw

Align the claw position by using an F-1 whose Pentaprism rail position has been adjusted with the tool.

5. MD winding torque

Winding static torque measured at the MD coupler must be under 2.3kg cm reguardless of film load.

Adjustment: Winding mechanism.

6. Adjustment of Range Finder

1) Adjust the mirror to 45°.
(Slackening the setscrew, from the rear, and adjust the 45° screw from the front.

2) Adjust the Rangefinder with Washers (13-9704) x n located under Mask.

3) Screw (X96-141185) set Mask position.
It is the screw at the lower right side of the mask as observed from Back Cover.

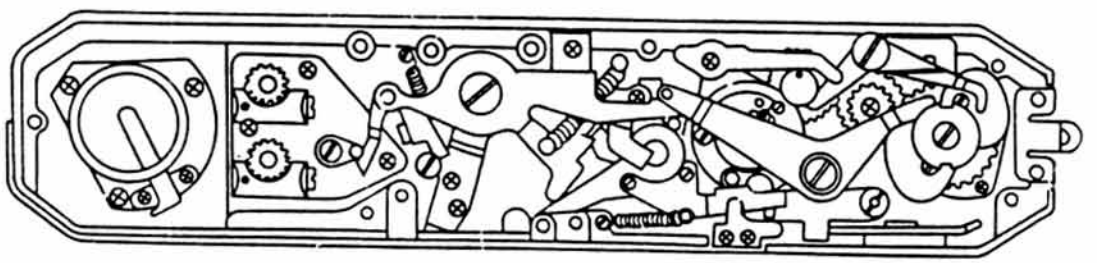
(Note 1) First, mount Screw (X96-141185).

(Note 2) Don't bend the Mask.

(Note 3) Flange back and lens focus must be adjusted before making this adjustment.

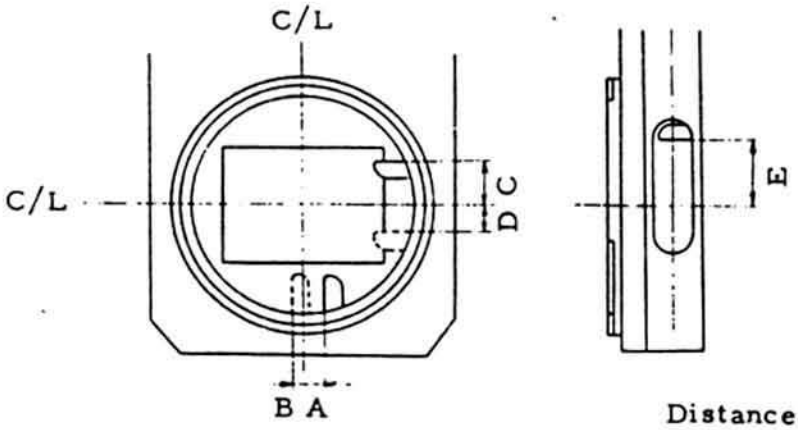
7. Camera Bottom Lever Position

Figure 42 shows the correct position of all the levers with the mechanism NOT wound.



# REFERENCE DATA

Lens Coupling




Distances measured from c/l 's.

1. Position of Automatic Diaphragm Release Lever

   With mechanism wound: A = 5.8 ± 0.3 mm

   During Exposure (B): B = 1.5 to 3.0 mm

   Shutter must be released securely within the range of A.

2. Automatic Diaphragm Release Lever Tension.

   The strength at the position, B = 2 mm: $160^{+40}_{-20}$ g (by means of tension gage)

3. Diaphragm timelag

   The time until 1st Curtain edge appears on the aperture frame from the Lever position, A = 4.8 mm: 26ms or more.

4. Position of Diaphragm Signal Lever

   Position with Lens removed: C = 8 ± 0.2 mm

   Maximum position: D = 8.5 mm

   The Lever must be operated smoothly.

5. Diaphragm Signal Lever Tension

   Over 10 g at C = 8.nm

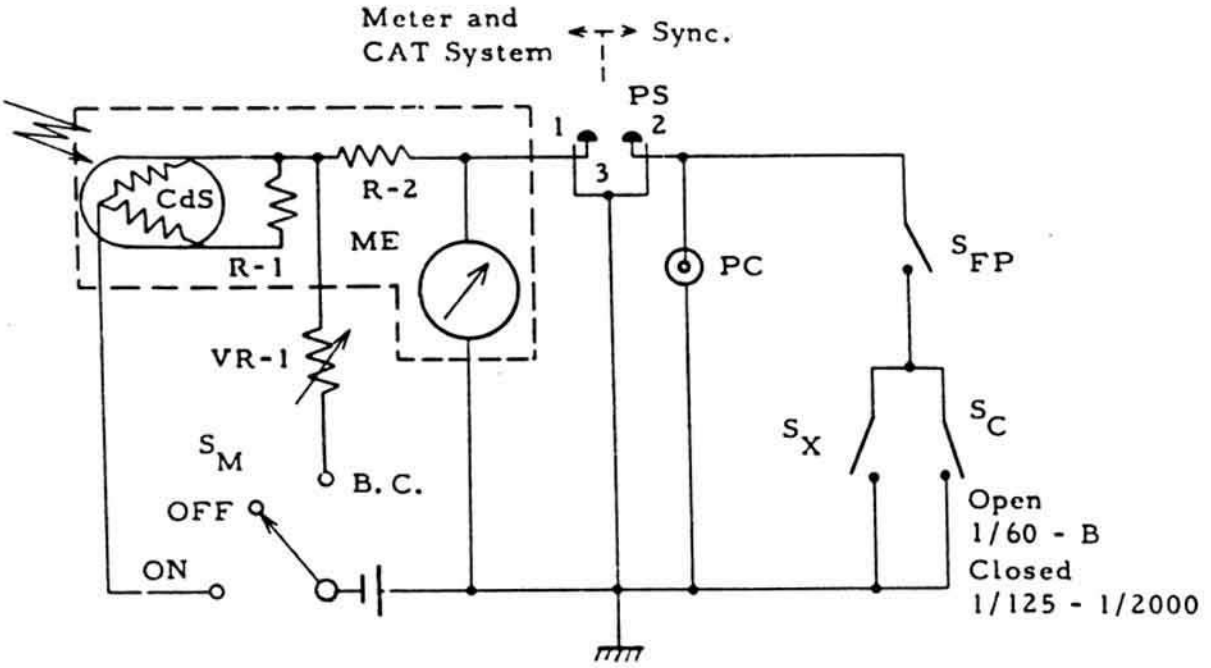
   Under 35 g at D = 7.5mm

6. Max Aperture Correction Pin.

   6.9 ± 0.1 mm below the mount face

7. Position of EE coupling lever:

   E = 17 ± 0.3 mm (E - C = 9 ± 0.1 mm)




Electronic Parts List

| | | | | | |
|---|---|---|---|---|---|
| BAT | Battery Hg (1.3V) H-D (Eqv. M-20, PX-625, E625N) | | $S_C$ | Sync. Change Switch | 19-0688 19-0616 |
| CdS | Photoconductor | | $S_{FP}$ | FP Sync. Switch | 19-0633 19-0634 |
| ME | Meter | Y00-1266 | | | |
| R-1 | Resistor | | $S_M$ | Main Switch | 19-0698 19-0699 |
| R-2 | Resistor | | | | |
| PC | Flash Plug | 19-0649 | $S_X$ | X Sync. Switch | 19-0688 19-0658 |
| PS | Acessory Shoe | | | | |
| | | 1 19-0830 | | | |
| | | 2 19-0764 | | | |
| | | 3 19-0646 | | | |

Note: Switch part numbers listed are for the main contacts only and are for reference. When ordering parts, refer to the parts list.

Check Points

| Motor Drive | Film Chamber 250 | Servo EE Finder | Booster Finder |
|---|---|---|---|
| | | 1. EE accuracy<br>2. Max. Aperture pin position<br>3. Aperture scale position<br>4. Bulb switch<br>5. Upper and lower limit switch | 1. Exposure a accuracy<br>2. Timer<br>3. VR and shutter dial position |
| 1. Release pressure<br>2. Shutter release stroke<br>3. Release button release point | | | 1. Shutter release button lock position<br>2. Shutter release button normal position |
| 1. Winding torque<br>2. No-load winding current<br>3. Timer speed<br>4. Braking<br>5. Winding switch timing<br>6. Auto contact switching | 1. Spool torque<br>2. Winding motor RPM<br>3. Switch parts<br>4. End-of-film Switch lever | | |
| | 1. Clamp lever tightening | 1. Lock claw position<br>2. Shutter dial position | 1. Lock claw position<br>2. Shutter dial position |
| | | | |
| 1. Insulation<br>2. Film counter | 1. Film counter | 1. Battery checker<br>2. Voltage limits | 1. Battery checker |

| Unit / Function | F-1 | FD Lens |
|---|---|---|
| Exposure | 1. Meter Accuracy<br>2. Max. Aperture correction pin<br>3. Signal lever torque<br>4. Shutter accuracy<br>5. Following needle position<br>6. Diaphragm time lag<br>7. MD contact timing | 1. Aperture size<br>2. Max. Aperture correction pin<br>3. Signal lever angle<br>4. Diaphragm lever torque |
| Release | 1. Shutter release point<br>2. Shutter Button stroke<br>3. Shutter release pressure | |
| Winding | 1. Winding torque<br>2. Spool torque<br>3. Perforation position | |
| Coupling | 1. Prism box rail position<br>2. Lock claw position | 1. Bayonet angle |
| Focusing | 1. Flange back<br>2. Focusing screen position<br>3. Freznal lens position | 1. Lens Focus |
| Other | 1. Film counter<br>2. Battery checker<br>3. Insulation | 1. EE pin height |

# CANON SERVICE TOOLS LIST

CANON F-1
(REF. No. 1-20711)

## TEST EQUIPMENT

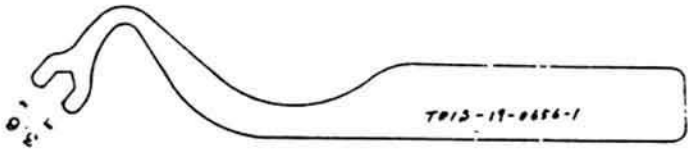
| Use | Names of Test Equipment |
|---|---|
| Shutter | 1. PA-16 Transistorized Shutter Tester or Simplified Shutter Test Unit<br>2. Drum Shutter Tester |
| Exposure Meter | 1. Inspection Device for Canon Meter-1<br>2. Standard Checker-2 (CdS) |
| Range View Finder | 1. Universal Range View Finder Collimator<br>2. Traveling Microscope |
| Mirror for 45 Degrees | 1. Universal Type [illegible] Degrees Collimator-1<br>2. Attachment for 90 Degrees Collimator-1 |
| Field of View | 1. Universal Parallax Collimator-1 |
| Flange | 1. 42.14 Dial Gauge |
| Adjustment | 1. SZ12-5 Torque Gauge 0.8 ~ 3Kgcm (Clockwise)<br>2. SZ14-1-20711-17 (Torque Gauge Head)<br>3. 1-20711 Penta Prism Guide Rail Positioning Tool-1<br>4. Anchor Release Lever Positioning Tool-1 |

## SPECIAL SCREW DRIVERS

| | | USE |
|---|---|---|
| T0630-13-8154-3 | | Tightening Meter Switch (Common to FT) |
| T0630-13-8627-3 | | Tightening Self-lever (Common to FT) |

T01S-19-0656-1

Adjusting
Shutter Speed

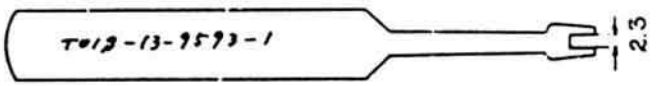



T0631-13-9415-1

Tightening
Winding Lever

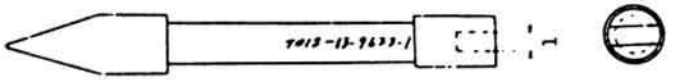
T01S-13-9593-1

Adjusting
Clamp



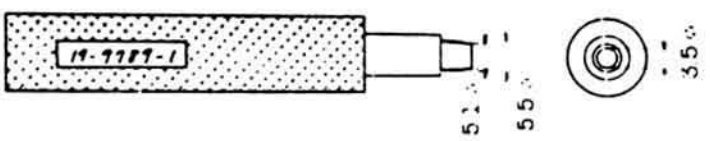

T01S-13-9633-1

Adjusting
Mirror for 45
Degrees




T0630-19-9789-1

Tightening
Synchro Terminal
(Common to 7S)




T06A-97-1091-1

Tightening
Shutter Charge
(Common to FT)